Appendix I Cost Analysis of Sediment Reduction Techniques

Imperial Valley, California

FIBERMAT - FULL INSTALLATION

Install C 350 FIBERMAT on a conventional drainage ditch

C 350 FIBERMAT is approximately 1 3/8 inches thick, useful life approximately 3 years and biodegradable.
Sample FIBERMAT costs from Ewing Irrigation 916/447-9530 (Mark Thomas and John Shering)
To build a fibermat ditch to serve 40, 60, 80, or 160 acres of farmland assuming a square field.

Cost of Material

Parameter	Value	Unit	Dimensions (ft.)	
			Width	Length
Cost/roll	$185.00	meters	2	30
Cost/running ft.	$1.88	feet	6.56	98.43

Cost by Field Size

Installation Cost: $0.18 /foot
Maintenance Cost: $0.30 /foot
Useful Life: 3 years

Field Size	Unit	Field Dimension		Material Cost		Cost/acre/year		
		Width (ft)	Length (ft)	Per Acre	Per Year	Installation	Maintenance	Total
40	acre	1,320	1,320	$62.03	$20.68	$1.98	$9.90	$32.56
60	acre	1,617	1,617	$50.64	$16.88	$1.62	$8.08	$26.58
80	acre	1,867	1,867	$43.86	$14.62	$1.40	$7.00	$23.02
160	acre	2,640	2,640	$31.01	$10.34	$0.99	$4.95	$16.28

Install C 125 FIBERMAT on a conventional drainage ditch

C 125 FIBERMAT is approximately 5/8 inches thick, useful life of 1 year and biodegradable..
To build a fibermat ditch to serve 40, 60, 80, or 160 acres of farmland assuming a square field.

Cost of Material

Parameter	Value	Unit	Dimensions (ft.)	
			Width	Length
Cost/roll	$120.00	meters	2	30
Cost/running ft.	$1.22	feet	6.56	98.43

Cost by Field Size

Installation Cost: $0.18 /foot
Maintenance Cost: $0.30 /foot
Useful Life: 1 year

Field Size	Unit	Field Dimension		Material Cost		Cost/acre/year		
		Width (ft)	Length (ft)	Per Acre	Per Year	Installation	Maintenance	Total
40	acre	1,320	1,320	$40.23	$40.23	$5.94	$9.90	$56.07
60	acre	1,617	1,617	$32.85	$32.85	$4.85	$8.08	$45.78
80	acre	1,867	1,867	$28.45	$28.45	$4.20	$7.00	$39.65
160	acre	2,640	2,640	$20.12	$20.12	$2.97	$4.95	$28.04

Grass-planted Shallow, Wide Drainage Ditch

Ditch total width 12 feet, depth at center 8 inches grass cover mowed to 2 inches in height.
Effective ditch width is 9 feet, with 9:1 side slope.
Ditch surface is planted to mixture of zorrow fescue, rose clover and blando brome, and can
To build a grass drain to serve 40, 60, 80, or 160 acres of farmland assuming a square field.

A 3 year Drain:

Cost of Material

Parameter	Cost	Unit	Dimensions (ft.)	
			Width	Length
Seed	$55.00	40 acres	1320	—
Fertilizer	$11.00	40 acres	1320	—
Total	$66.00	40 acres	1320	—
Per Foot of Drain	$0.05	foot	—	—

Installation Costs

Parameter	Cost	Unit	Width
grader , 4 hrs	$125	40 acres	1320
grader delivery	$60	40 acres	1320
broadcast/harrow	$150	40 acres	1320
Total	$335	40 acres	1320
Per Foot of Drain	$0.25	foot	—

Maintenance Cost:

Parameter	Cost	Unit	Width
3 x mowing	$45	40 acres	1320
3 x mower delivery	$33	40 acres	1320
Weed/pest cntl	$28	40 acres	1320
Total	$106	40 acres	1320
Per Foot of Drain	$0.08	foot	

Useful Life: 3 years

Field Size	Unit	Field Dimension		Material Cost		Cost/acre/year		
		Width (ft)	Length (ft)	Per Acre	Per Year	Installation	Maintenance	Total
40	acre	1,320	1,320	$1.65	$0.55	$2.79	$2.65	$5.99
60	acre	1,617	1,617	$1.35	$0.45	$2.28	$2.16	$4.89
80	acre	1,867	1,867	$1.17	$0.39	$1.97	$1.87	$4.24
160	acre	2,640	2,640	$0.83	$0.28	$1.40	$1.33	$3.00

Grass-planted Shallow, Wide Drainage Ditch
A 5 year Drain:

Cost of Material

Parameter	Cost	Unit	Dimensions (ft.)	
			Width	Length
Seed	$50.00	40 acres	1320	—
Fertilizer	$10.00	40 acres	1320	—
Total	$60.00	40 acres	1320	—
Per Foot of Drain	$0.05	foot	—	—

Installation Costs

Parameter	Cost	Unit	Width
grader , 4 hrs	$120	40 acres	1320
grader delivery	$60	40 acres	1320
broadcast/harrow	$140	40 acres	1320
Total	$320	40 acres	1320
Per Foot of Drain	$0.24	foot	—

Maintenance Cost:

Parameter	Cost	Unit	Width
3 x mowing	$40	40 acres	1320
3 x mower delivery	$30	40 acres	1320
Weed/pest cntl	$25	40 acres	1320
Total	$95	40 acres	1320
Per Foot of Drain	$0.07	foot	—

Useful Life: 5 years

Field Size	Unit	Field Dimension		Material Cost		Cost/acre/year		
		Width (ft)	Length (ft)	Per Acre	Per Year	Installation	Maintenance	Total
40	acre	1,320	1,320	$1.50	$0.30	$1.60	$2.38	$4.28
60	acre	1,617	1,617	$1.22	$0.24	$1.31	$1.94	$3.49
80	acre	1,867	1,867	$1.06	$0.21	$1.13	$1.68	$3.02
160	acre	2,640	2,640	$0.75	$0.15	$0.80	$1.19	$2.14

Sediment Pond

Annualized Cost Estimate

Construct a 5.45 af capacity pond

Gross Acres: 160

Net Acres: 145

Construction Costs (initial):			
	Cost	$/acre	
pond	$6,000	$41.38	
inlet/outlet	$500	$3.45	
Total	$6,500	$44.83	
Excavation Costs:			
	$11,400	$78.62	5 yr cycle
Maintenance Costs (annual):			
Weed/pest cnt	$400.00	$2.76	

Project Year	Construction Cost	Cleanout each 8 yrs	Weed/Pest Control	TOTAL Cost	Real Discount Rate 6.0% Present Value
1	$6,500			$6,500	$6,500
2			$400	$400	$377
3			$400	$400	$356
4			$400	$400	$336
5			$400	$400	$317
6		$11,400	$400	$11,800	$8,818
7			$400	$400	$282
8			$400	$400	$266
9			$400	$400	$251
10			$400	$400	$237
11		$11,400	$400	$11,800	$6,589
12			$400	$400	$211
13			$400	$400	$199
14			$400	$400	$188
15			$400	$400	$177
16		$11,400	$400	$11,800	$4,924
17			$400	$400	$157
18			$400	$400	$149
19			$400	$400	$140
20			$400	$400	$132
21		$11,400	$400	$11,800	$3,679
TOTAL	$6,500	$45,600	$8,000	$60,100	$34,284

Equivalent Annual Amount
$2,914.28

Averaged over a production acreage of:	145	acres
The annual const + maint. costs are:	$20.10	per acre
The pond sediment retention is expected to be:	5.39	tons per year per acre
The cost of one ton of sediment removed from the system:	$3.73	per ton

Additional Irrigation Labor

Irrigators paid in 24-hr shift: $140 per day, for 40 acres of field crops

This indicates an irrigation rate of 2 acres per hour performed by 2 irrigators working together.

If an additional (third) irrigator is hired, the irrigation cost increases by about $35 per acre of veg/row cro

Veg/Row Crop Typical Furrow Irrigation Costs:

Crop	Number of Irrigations	Irrigation Cost					
		Current			With Additonal Irrigator		
		$/acre/year	$/Irr.	$/Irr./40 ac.	$/Irr./40 ac.	$/acre/year	Increase $/ac.
Lettuce	9	$58.50	$6.50	$260.00	$400	$90.00	$31.50
Cotton	10	$60.00	$6.00	$240.00	$380	$95.00	$35.00
Melons	8	$60.00	$7.50	$300.00	$440	$88.00	$28.00
Watermelons	10	$72.50	$7.25	$290.00	$430	$107.50	$35.00
Carrots	8	$82.50	$10.31	$412.50	$553	$110.50	$28.00
Onions	12	$97.50	$8.13	$325.00	$465	$139.50	$42.00

Source: University of California Cooperative Extension.

If the single-irrigator system, employing one worker working for 24 hours is replaced by 2 irrigators, each working 12 hours, at $7.75 per hour:

Field Crops, Flood-Irrigated, 24 Hour Set

Crop	Number of Irrigations	Irrigation Cost					
		Current, One 24 hour Irrigator			With Two 12 Hour Irrigators*		
		$/acre/year	$/Irr.	$/irr/80 ac.	$/irr/80 ac.	$/acre/year	Increase $/ac
Alfalfa	16	$28.00	$1.75	$140.00	$186.00	$37.20	$9.20
Sudan	6	$10.50	$1.75	$140.00	$186.00	$13.95	$3.45

When irrigators are paid hourly rate: $7.75 per hour

The **annual production cost increase for alfalfa** is approximately **1.3%**
and the annual **cost increase for sudan** is approximately **0.8%**